

(d) When the filters do not have separable holders and gaskets, the exhalation valves shall be blocked so as to ensure that leakage, if present, is not included in the filter efficiency level evaluation.

(e) For non-powered air-purifying particulate respirators with a single filter, filters shall be tested at a continuous airflow rate of  $85 \pm 4$  liters per minute. Where filters are to be used in pairs, the test-aerosol airflow rate shall be  $42.5 \pm 2$  liters per minute through each filter.

(f) *Filter efficiency test aerosols.* (1) When testing N-series filters, a sodium chloride or equivalent solid aerosol at  $25 \pm 5$  °C and relative humidity of  $30 \pm 10$  percent that has been neutralized to the Boltzmann equilibrium state shall be used. Each filter shall be challenged with a concentration not exceeding 200 mg/m<sup>3</sup>.

(2) When testing R-series and P-series filters, a neat cold-nebulized dioctyl phthalate (DOP) or equivalent aerosol at  $25 \pm 5$  °C that has been neutralized to the Boltzmann equilibrium state shall be used. Each filter shall be challenged with a concentration not exceeding 200 mg/m<sup>3</sup>.

(3) The test shall continue until minimum efficiency is achieved or until an aerosol mass of at least  $200 \pm 5$  mg has contacted the filter. For P-series filters, if the filter efficiency is decreasing when the  $200 \pm 5$  mg challenge point is reached, the test shall be continued until there is no further decrease in efficiency.

(g) The sodium chloride test aerosol shall have a particle size distribution with count median diameter of  $0.075 \pm 0.020$  micrometer and a standard geometric deviation not exceeding 1.86 at the specified test conditions as determined with a scanning mobility particle sizer or equivalent. The DOP aerosol shall have a particle size distribution with count median diameter of  $0.185 \pm 0.020$  micrometer and a standard geometric deviation not exceeding 1.60 at the specified test conditions as determined with a scanning mobility particle sizer or equivalent.

(h) The efficiency of the filter shall be monitored and recorded throughout the test period by a suitable forward-

light-scattering photometer or equivalent instrumentation.

(i) The minimum efficiency for each of the 20 filters shall be determined and recorded and be equal to or greater than the filter efficiency criterion listed for each level as follows:

P100, R100 and N100: Efficiency  $\geq 99.97\%$

P99, R99 and N99: Efficiency  $\geq 99\%$

P95, R95 and N95: Efficiency  $\geq 95\%$

#### § 84.182 Exhalation valve leakage test; minimum requirements.

(a) Dry exhalation valves and valve seats will be subjected to a suction of 25 mm. water-column height while in a normal operating position.

(b) Leakage between the valve and valve seat shall not exceed 30 milliliters per minute.

### Subpart L—Chemical Cartridge Respirators

#### § 84.190 Chemical cartridge respirators: description.

(a) Chemical cartridge respirators including all completely assembled respirators which are designed for use as respiratory protection during entry into or escape from atmospheres not immediately dangerous to life and health, are described according to the specific gases or vapors against which they are designed to provide respiratory protection, as follows:

Type of chemical cartridge respirator <sup>1</sup>	Maximum use concentration, parts per million
Ammonia .....	300
Chlorine .....	10
Hydrogen chloride .....	50
Methyl amine .....	100
Organic vapor .....	<sup>2</sup> 1,000
Sulfur dioxide .....	50
Vinyl chloride .....	10

<sup>1</sup>Not for use against gases or vapors with poor warning properties (except where MSHA or Occupational Safety and Health Administration standards may permit such use for a specific gas or vapor) or those which generate high heats of reaction with sorbent material in the cartridge.

<sup>2</sup>Maximum use concentrations are lower for organic vapors which produce atmospheres immediately hazardous to life or health at concentrations equal to or lower than this concentration.

(b) Chemical cartridge respirators for respiratory protection against gases or vapors, which are not specifically listed with their maximum use concentration, may be approved if the applicant